MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2022/2023

EET1156 – BASIC ELECTRICLA ENGINEERING

(ME)

6 JULY 2023
2.30 p.m. – 4.30 p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 5 pages including the cover page with 4 Questions only.

2. Attempt **ALL** of the questions . The distribution of the marks for each question is given .

3. Please write all your answers in the Answer Booklet provided .

Question 1

(a) Determine v_a of the circuit in Figure Q1(a). Then solve for i_s and compute the current i_x. [8 marks]

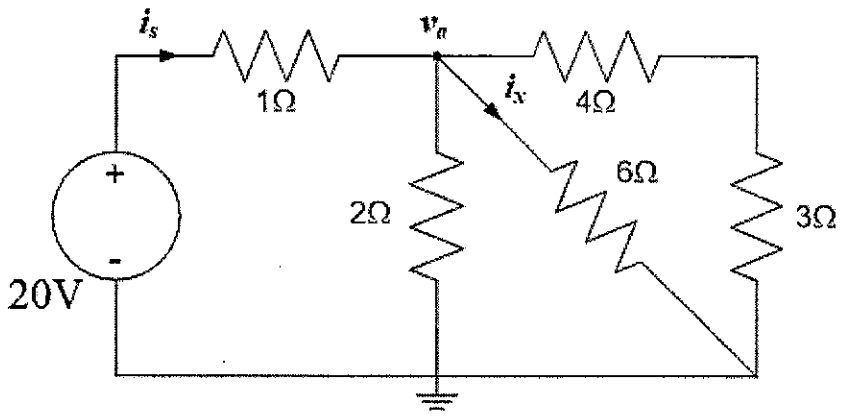

Figure Q1(a)

(b) Given R=10Ω, L=0.1H and C=100μF are connected in series and supplied by v(t)=24 cos(50t). Calculate the total current. [6 marks]

(c) Determine the current through the **j5 Ω** impedance of the circuit shown in Figure Q1(b) by using mesh current analysis. [16 marks]

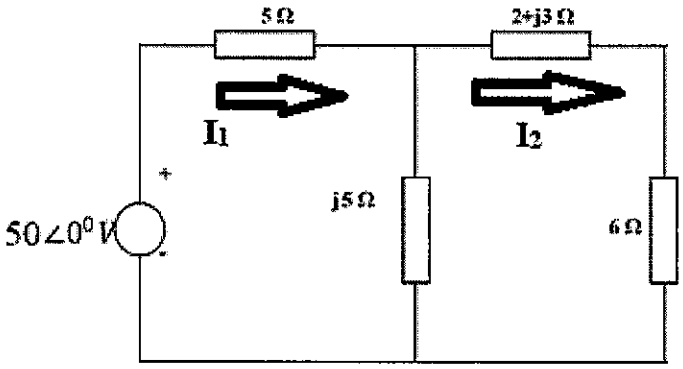

Figure Q1(b)

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Question 2

(a) A parallel plate capacitor is filled with air between the two plates. The cross-sectional area of each plate is 10×10^{-3} m^2 and the distance between the plates is 3 mm:

(i) Find the capacitance value for the capacitor. [3 marks]
(ii) Determine the magnitude of charge on each plate if a 100 V source is connected to the capacitor. [2 marks]
(iii) If a medium with known relative permittivity of 5 is now placed in between the two plates causing the separation distance to increase to 4 mm, find the charge on the plate. [4 marks]
(iv) Determine the flux density for the capacitor states in part (iii). [3 marks]

(b) Figure Q2 shows a magnetic system where the depth of the core is 20 cm and the relative permeability of the core (μ_r) is 3000. If the current flowing through the coil is 3 A and the coil has 600 turns, calculate:-

(i) the flux in the core; [7 marks]
(ii) the flux densities at top and bottom of the core; and [4 marks]
(iii) find the current in the coil. [2 marks]

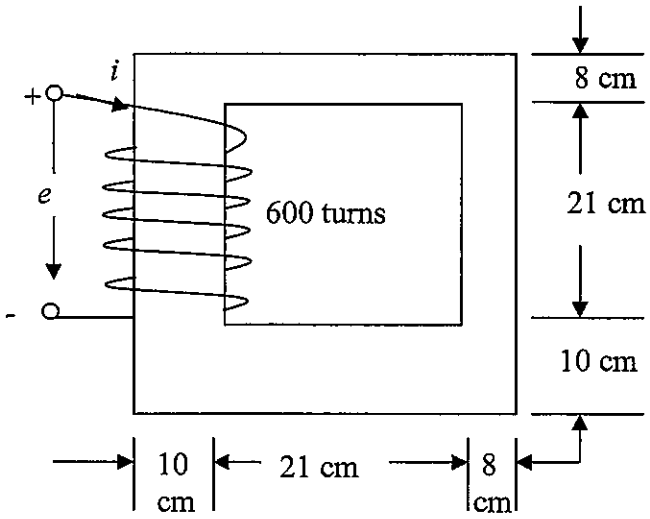

Figure Q2

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Question 3

(a) Sketch the Diode Current-Voltage curve in the forward, reverse and breakdown regions. [6 marks]

(b) For the emitter bias circuit shown in Figure Q3, find I_B, I_C, V_C, V_B and V_E for β = 85 and V_{BE} = 0.7V.
Given that V_{CC} = +20 V, R_B = 100 kΩ, R_C = 4.7 kΩ, and R_E = 10kΩ. [13 marks]

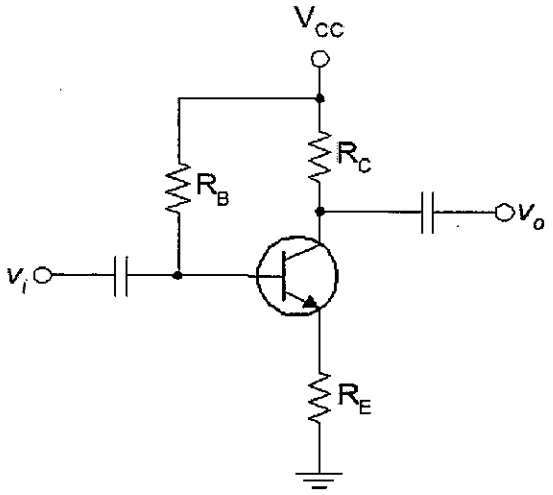

Figure Q3

(c) Draw a typical non-inverting operational amplifier by labeling the input v_i, output v_0, resistance R_1 and R_f. [4 marks]

If v_i = 0.5 V, v_0 = 2.5 V and R_1 = 1 kΩ, calculate the value of R_f. [2 marks]

Continue...

Question 4

(a) Using Boolean logic, simplify the following expressions and draw the simplified logic circuit for each expression.

(i) $f(w,x,y,z) = x + xyz + \bar{x}yz + wx + \bar{w}x + \bar{x}y + \bar{x}yw$

(ii) $f(x,y,z) = y\bar{z}(\bar{z} + \bar{z}x) + (\bar{x} + \bar{z})(\bar{x}y + \bar{x}z)$

[5+5 marks]

(b) Given the truth table as in Table Q4, draw the simplified logic circuit using K-Map.

[10 marks]

Table Q4

Input A	Input B	Input C	Output Y
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

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